

REMARKS

The Examiner has indicated that claims 1-68 are all the claims pending in the application. However, claims 1-11 were canceled in the Preliminary Amendment filed on July 28, 2000. Accordingly, only claims 12-68 were previously pending.

Claims 1-11, 20-22, 30-33, 53, 54, 57-60, 63 and 65-68 are withdrawn from consideration as being drawn to a non-elected invention. Applicant has added new claims 69-82 by this Amendment. Accordingly, it is believed that claims 12-82 are presently pending.

Applicant thanks the Examiner for acknowledging patentable subject matter in claims 42-52, 54, 55 and 61, all of which are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form. Claims 12-19, 23-29, 34-41, 62 and 64 presently stand rejected and claim 23 is also objected to because of an informality.

In regard to the claim rejections, claim 12 is rejected under 35 U.S.C. § 112, second paragraph; Claims 12-16, 19, 23, 24, 26, 28, 29, 34-36, 39-41 and 64 are rejected under 35 U.S.C. § 102(e) as being anticipated by Molnar et al. (USP 6,081,566); Claims 17, 18, 25, 27 and 62 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Molnar et al. in view of Rostamy (USP 6,330,431); and Claim 38 is rejected under 35 U.S.C. § 103(a) as being unpatentable over Molnar et al. in view of Saito et al. (USP 5,203,023). For the reasons set forth below, Applicant respectfully traverses the objection and rejections and requests favorable disposition of the application.

Claim Objection

In regard to the objection of claim 23, Applicant has amended the claim to address the informality. Withdrawal of the objection is, thus, in order.

§112 Rejection

In regard to the claim rejection of claim 12 under 35 U.S.C. § 112, second paragraph, claim 12 has been amended. Applicant submits that claim 12 satisfies all requirements of 35 U.S.C. § 112. Withdrawal of the §112 rejection is kindly requested.

Prior Art Rejections

In regard to the prior art rejections, Applicant respectfully submits that the disclosures of the asserted references are completely different than the invention disclosed and claimed in the present application. For example, the systems disclosed in at least Molnar et al., Rostamy et al. and Saito et al. are directed to diversity receivers in which at least two independent antennas/receivers are used to determine signal strength. That is, in a typical diversity antenna system a circuit switches back and forth between two antennas, choosing the stronger signal and routing it to the circuitry of the receiver. Accordingly, the noise is eliminated, or avoided. In another type of diversity receiver system two complete receivers are provided and a circuit switches back and forth between the cleaner signal.

Neither type of diversity system mentioned above is remotely similar to the system disclosed and claimed in the present application at least because the system of the present invention uses a single antenna, as opposed to the diversity systems disclosed in the asserted prior art, and processes subsequent signal samples in a manner that increases the signal level while overwhelming the interference, without attempting to eliminate the interference.

Also, the invention disclosed and claimed can deal with signals that occur in stand alone applications in communication reception including satellite reception and Radar applications where there is a need to process rapidly fluctuating signal “echos” from complex targets. These

must be dealt with by using high speed processing and the use of a large bandwidth (neither of which is apparent in Molnar et al. or the other asserted references). For example, Molnar et al. does not consider phase dispersion problems in that they do not process noise free numbers in pattern calculation.

Accordingly, Applicant submits that the asserted prior art references approach the problem of obtaining cleaner signals in such a completely different way than the claimed invention, that the references are of little relevance with respect to the instant claims. However, specific differences between the claims and the asserted prior art references is described below. Applicant has amended the claims to further clarify some of the differences.

Claims 12-19

Molnar et al. discloses a system that is highly dependent on polarization discrimination for distinguishing different received signals. The invention claimed, however, does not consider polarization discrimination.

As stated in Molnar et al. at column 2, line 57 through column 3, line 3;

The present invention achieves the above objectives, . . . by transmitting a signal representing a transmitted symbol sequence and receiving the signal on at least two separate antennas. The signal is processed to produce received signal samples for each of the antennas. Channel taps are estimated for each of the antennas. Impairment correlation properties between antennas are also estimated. Branch metrics are formed in a branch metric processor using the received signal samples and the channel tap and impairment correlation estimates. The branch metrics are employed in a sequence estimation algorithm to estimate the transmitted symbol sequence.

(emphasis added)

The claimed invention, however, does not attempt to identify a modulation sequence. The present invention accomplishes its objectives by greatly enhancing the carrier signal received from a single antenna, so much so that the various forms of interference are overwhelmed. This involves comparison between adjacent half-cycles of a high frequency carrier to produce a sinusoidal pattern in which effects that are caused by propagation anomalies, e.g., Doppler, and other forms of interference, are minimized to a tolerably low level. Also, by utilizing a wide bandwidth and high frequency carrier (i.e., IF) processing, the desired noise estimates are obtained in a very short amount of time (e.g., in nanoseconds). Thus, it is clear that the respective basic implementations of the claimed system and the Molnar system are quite different. Specifically, however, at least because Molnar requires two separate antennas, as opposed to the claimed single antenna of the present application, Molnar et al. does not anticipate claim 12, or any claim dependent thereon, i.e., claims 13-19.

Furthermore, the present invention represents a “stand alone” antenna array with the ability to greatly enhance the reception of a signal of unknown magnitude and direction with only the broad frequency band known. By being configured in this way, a system in accordance with the claimed invention is capable of achieving its objectives without any special additional transmitted signal augmentations.

That is, one of the key features of the present invention is the ability to process two successive signals each of which is associated with independent samples of broad-based noise at a rate that permits two successive signal samples to be essentially the same. This involves processing the information at a carrier (or IF) frequency which is high enough to achieve such a desired situation.

For at least the above reasons, Applicant submits that claims 12-19 are patentable over Molnar et al.

In addition to its dependency on claim 12, claim 14 recites independently patentable subject matter. For instance, claim 14 recites; “a zero phase reference is established for a carrier signal that is synchronized to an internal system timing generator from which reference in-phase (I) and quadrature (Q) components are established rapidly, said I and Q components being processed independently over a relatively wide bandwidth.” Neither Molnar et al. nor any of the other cited prior art references teach or suggest these features. The passage of Molnar et al. cited by the Examiner as teaching these features merely discloses the use of I and Q samples and log-polar processing in order to enable adaptive gain control. (column 7, lines 27-34). Nothing at all is mentioned in Molnar et al. about processing a carrier signal for obtaining the I and Q signals. Nor is anything stated about synchronizing the carrier signal with an internal timing signal.

For this additional reason, claim 14 is patentable over the cited prior art.

Claim 23

Applicant submits that Molnar et al. does not teach or otherwise disclose, “wherein said angular discrimination is improved by a phase multiplying process using two or more groups of said receive signals, in which the noise has been reduced to permit non-dispersive phase multiplication, each group having a separation of different numbers of half wavelengths.” For at least this reason, Applicant submits that claim 23 is patentable over Molnar et al.

Claims 24-29 and 62

The examiner's assessment and subsequent rejections of claims 24-29 and 62, fail to adequately take into account the serious limitations that result from the phase dispersion that occurs when a phase angle is multiplied, such as that which is disclosed in Molnar et al.

In particular, independent claim 24 recites a plurality of groups, each group containing data having a similar phase, wherein the phase corresponding to each group is a multiple of the phase corresponding to the other groups, the multiple being determined by a spacing between right and left elements of each group from the center of the antenna array. Nowhere in Molnar et al. is such a configuration disclosed. More particularly, at column 3, lines 35-45, Molnar et al. discloses M co-phased antenna elements "which may be a combination of both horizontally and vertically polarized antenna elements." However, there is nothing in Molnar et al. that teaches or suggests that the antenna elements are grouped into groups of elements having similar phases and where each individual group's phase is a multiple of the other groups' respective phases. For at least this reason Molnar et al. does not anticipate any of claims 24-29 and 62.

Nor is it disclosed in Molnar et al. that respective phase multipliers, between groups of elements respectively made up of right and left-side elements, are determined by a spacing between the elements measured from the center of the array. For this additional reason, Molnar et al. does not anticipate any of claims 24-29 and 62.

Rostamy et al. fails to compensate for the deficiencies of Molnar et al. mentioned above. Accordingly, the combination of Molnar et al. and Rostamy et al. does not meet all the requirements of claims 24-29 and 62 and, thus, does not render any of these claims obvious.

Claims 34-37 and 64

Independent claim 34 has been amended for clarification purposes only. Applicant submits that claim 34, as originally presented, distinguishes over the prior art. In particular, Molnar et al. fails to teach or suggest a means for aggregating outputs of selected right and left side elements of an antenna array. More specifically, however, Molnar et al. does not disclose an aggregation of signal-plus-noise voltages in digital form where the digital values are used to perform iterative processing. For at least these two reasons, Molnar et al. does not anticipate claim 34.

To expedite prosecution and for clarification purposes only, however, Applicant has amended claim 34. Applicant submits that Molnar et al. does not teach or suggest an aggregation of signal-plus-noise voltages in digital form used to modify a topological number array (TNA) in several steps to form a near real time estimate of the noise. For this additional reason Molnar et al. does not anticipate any of claims 34-37 and 64.

Claim 38

As discussed above, both Molnar et al. and Saito et al. each disclose a diversity receive system, which represents an entirely different approach than the claimed system. In particular, claim 38 recites a single antenna. Molnar et al. and Saito et al. each require multiple antennas, as discussed above. Accordingly, claim 38 is not taught or suggested by the proposed combination of Molnar et al. and Saito et al.

Additionally, neither Molnar et al. nor Saito et al. disclose a device operable to select datapoints in a sextet, octet or other evenly distributed group, wherein the device determines a deviation for each individual datapoint of said sextet, octet or other evenly distributed group,

from the average of each group to determine which datapoint constitutes a minimum absolute value of the deviations from the average. There is nothing in Saito et al. , in particular at column 1, lines 28-45, that even suggests that an average is determined amongst a group of datapoints in order to determine an absolute minimum deviation. For this additional reason, claim 38 is patentable over the proposed combination of Molnar et al. and Saito et al.

Claims 39 and 40

Molnar et al. does not disclose forming left and right topological groupings where the groupings are formed about a topocentric reference of the two groupings that corresponds to a zero value injection from a stored predetermined value injection pattern comprised of positive and negative steps. There is nothing within Molnar et al., especially within the passage cited by the Examiner, i.e., column 7, lines 10-34, that even remotely suggests this feature. Applicant submits that claims 39 and 40 are patentable over the asserted prior art reference.

Claims 41-52, 55, 56 and 61

Molnar et al. does not disclose sensing how the injection of a programmed iterative value will change a relative location within an array by sensing, in progressive steps, when each injected iterative value causes a match in the numerical values of signal-plus-noise from two rows of a numerical array to be further from, or closer to, a topocentric center of left and right portions of the array. There is nothing within Molnar et al., especially within the passage cited by the Examiner, i.e., columns 11-13, that even remotely suggests this feature. Accordingly, Applicant submits that claims 41-52, 55, 56 and 61 are patentable over the asserted prior art reference.

AMENDMENT UNDER 37 C.F.R. § 1.111
U.S. Appln. No. 09/453,526

Patentability of New Claims


For additional claim coverage merited by the scope of the invention, Applicant has added new claims 69-82. Applicant submits that the prior art does not disclose, teach, or otherwise suggest the combination of features contained therein.

Conclusion

In view of the foregoing remarks, the application is believed to be in form for immediate allowance with claims 12-82, and such action is hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, he is kindly requested to **contact the undersigned** at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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